STATEMENT OF DEREK MILLAR

I, Derek Millar of [redacted] Project Manager (SEQ Projects Branch), Major Infrastructure Projects Division of the Department of Transport and Main Roads, state as follows:-

Qualifications and experience

1. I am currently the Project Manager (SEQ Projects Branch) | Project Delivery DTMR Project Manager for the Ipswich Motorway Upgrade Project (Dinmore to Goodna). I have worked on the project since September 2007 and have been Project Manager since February 2008.
2. In this role, I report to the Project Director, Gerald Murphy.
3. The primary functions and duties of my role include:
   - plan, coordinate and manage the concept planning, development and implementation phases of the project within specified time-frames and budget;
   - ensure the delivery of the project provides value for money;
   - ensure that project team has the necessary systems and people capability to meet current and future demands and risks;
   - prepare and deliver submissions and reports relating to planning and technical issues;
   - identify appropriate mitigation strategies to overcome problems or obstacles related to the project;
   - contribute to public consultation activities and ensure that effective liaison is undertaken with community, local governments and other major stakeholders;
   - act as "Representative of the Principal" for the delivery contracts, as defined and delegated at respective development / implementation phases; and
   - lead the development of best practice technology and project management methodology within the department.
4. I hold the following professional qualifications: Bachelor Degree: Civil Engineering (1996); National Higher Diploma: Civil Engineering (1991); and National Diploma: Civil Engineering (1989). I am a Chartered Engineer - 3065504 (Engineers Australia) and a Registered Professional Engineer Queensland - 09907 (Board of Professional Engineers Queensland).
5. I have twenty years experience in design, construction, supervision and project management (infrastructure delivery) of civil engineering contracts namely road projects and related structures projects using a variety of delivery methodologies.

Ipswich Motorway Upgrade Project (Dinmore to Goodna)

6. The Ipswich Motorway Upgrade: Dinmore to Goodna (the project) started construction in June 2009 as part of the Federal Government's $1.95 billion commitment to upgrading the Ipswich Motorway. The Department of Transport and Main Roads

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Derek Millar **Witness**

(DTMR) together with Abigroup, Fulton Hogan, Seymour Whyte, SMEC Australia and Parsons Brinckerhoff formed the Origin Alliance to deliver the project.

7. The Alliance Manager (AM) leads and manages the Alliance. The AM formed the Alliance Management Team (AMT) of which I am a member. The AMT and AM report to the Alliance Leadership Team (Gerald Murphy is a member of the ALT).

8. The Monash Road overpass formed part of the scope of the project.

9. The new motorway has been designed to remain trafficable for both local and regional Q100 flood events.

10. **Local Event**

    Localised and/or flash flooding typically occurs when intense rainfall falls over a small sub-catchment which responds to that rainfall in six hours or less. Inundation is expected to last only for a limited period of time until the run-off is able to drain away. In urban or rural areas where drainage is poor, the risk of localised flooding is high under such circumstances. Often a local flood event is more extreme in its impact than a regional flood event.

    Regional Event

    Widespread flooding, by contrast, occurs following rainfall of high intensity or long duration over the whole, or a large proportion of a catchment. Continuous heavy rainfall across a number of river catchments is likely to cause inundation across an extensive area. It may take a number of days for these floodwaters to subside.

General

11. The drainage system for the project has been designed to ensure an acceptable level of flood immunity for the Ipswich Motorway, including the adjacent service roads. The system must ensure that the works do not have an unacceptable impact on the hydraulic regime of the area including also adjacent properties. This is achieved by including adequately sized and located culverts, water diversions and other works in the design.

12. The project brief (Scope of Works and Technical Criteria – SWTC) requires that the Ipswich City Council (ICC) controlled service roads and ramps be designed so that the lowest point of each carriageway's pavement surface is protected from flooding and is 100 mm above the 20 year Average Recurrence Interval (ARI) flood level for cross drainage. This includes all locations where the works intercept runoff, floodplains, watercourses, depressions or drainage lines. The cross drainage structures have therefore been designed to convey the peak flows from the 20 year ARI storm event as a minimum.

Design Methodology

13. Generally, the proposed service road transverse culverts have been sized to ensure peak water levels upstream and downstream of structures do not exceed existing flood levels by more than 10 mm (10 – 20mm is not considered measurably significant given the factors / uncertainties in modelling). The culverts also provide flood immunity to the service roads for the 20 year Average Recurrence Interval (ARI) storm for the local catchment. Two scenarios were considered as follows:

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(a) Base scenario – The hydrology of, and hydraulic calculations for the existing culverts were undertaken to estimate the existing 20 year ARI, 100 year ARI and Probable Maximum Flood (PMF) water levels and velocities upstream and downstream of the culverts. In this scenario, sub-catchment characteristics were assumed to be fully developed. A typical blockage factor of 20% was included in the analysis.

(b) Upgrade scenario – The hydrology of, and hydraulic calculations for the upgraded service roads and culverts were undertaken to estimate the water levels and velocities upstream and downstream of each culvert for the 20 year ARI and 100 year ARI. The Probable Maximum Flood (PMF) event was modelled at the culverts installed under the Monash Road embankment (culvert C-FS950) as requested by ICC to ensure that the proposed works do not adversely impact neighbouring residents. Sub-catchment characteristics were assumed to be fully developed. A minimum of 20% and maximum of 50% blockage is included in the analysis, depending on the inlet type.

14. The project brief states that any new infrastructure constructed must not generate additional afflux (increase the existing flood levels) that may impact on property not owned by DTMR. In some cases it is not possible to completely contain additional afflux and an analysis is carried out to understand the nature of the impact. Accordingly the project designers modelled (local flood modelling) the impact of the construction of the Monash Road overpass and provided a design that does not impact (increase the flood risk) on adjacent residential properties by installing 5 pipe culverts under the newly constructed road embankment. This design also accounts for any storage that was lost by the construction of the new embankment.

15. The motorway alignment was designed for regional flooding using the Brisbane River Flood Model (2006), provided by the Brisbane City Council. The data/information from this model was used to develop local flood models for the works undertaken by the project. Flood modelling of this nature (eg. for very large rivers such as the Brisbane River) remain current for a considerable period of time subject to changes in modelling procedures, significant changes in the river alignment / catchment and or rainfall. This type of modelling is not normally undertaken for local projects and was only considered given the relative proximity to the Brisbane River.

Upgrade culvert FS950

16. A 25 hectare catchment contributes flows to the proposed culvert C-FS950. This includes a portion of the Queensland Rail (QR) workshops, Brisbane Terrace, the QR railway corridor to the north and the residential area (Jabiru Place) at the lower end.

17. An existing 1050mm diameter RCP conveys flows under Brisbane Terrace. In addition, 3 x 300mm diameter RCP stormwater pipes convey runoff from an open area adjacent to Brisbane Terrace.

18. Flows pass beneath the QR rail line through a single 18m long 1050mm diameter concrete pipe. Additional QR subcatchments contribute to the flow at the upstream and the downstream side of this culvert. A natural channel then conveys flows to the McAuliffe Street culvert. Runoff from nearby residential areas is discharged via a pipe in the vicinity of the existing culvert inlet.

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19. The existing culvert across McAuliffe Street consists of a single 1050 mm diameter RCP, approximately 11 m long. The existing culvert collects runoff from the entire catchment west of McAuliffe Street and discharges into a pond to the east within the Pan Pacific Peace Gardens. This pond level is controlled via a spillway that discharge flows to Goodna Creek approximately 150m away.

20. When the headwater level exceeds approximately 17.0m, flows in excess of the QR culvert capacity can spill to a channel/ overland flow path along the northern side of the railway embankment. This diversion of flows can reduce the impact of flooding on downstream properties for large flood events. However in extreme and rare events, it is expected that a portion of flows will overtop the QR rail embankment and flow towards the culverts at McAuliffe Street.

21. The Monash Road upgrade incorporates an overpass crossing the QR track and a significant road embankment a short distance upstream of the retained McAuliffe street roadway. The embankment will remove the existing overland flow path for the catchment. The provision of the upgrade accordingly required the construction of a new culvert at this location.

22. A meeting was held with ICC to discuss the impact of the embankment on local flood risk. A copy of the IMU Drainage-ICC minutes of meeting dated 21st September 2009 are attached and marked **Attachment A**. The outcome of the meeting was a request from ICC to:

    (a) Specifically consider a 50% blockage* of the culvert in a 100 year flood event;

    (b) Provide a positive overflow, such as a channel, for an emergency bypass should the culvert become excessively blocked.

    * Blockage factor means that the pipe culvert capacity is reduced by 50% due blockages caused by debris. There are no exact quantitative guidelines for the application of blockage factors.)

23. This approach differed from that specified in the Drainage Design Criteria Report (DGRODR101) and the approach used on all other culverts through out the corridor, which was a 50% screen blockage and a 20% culvert blockage. However as requested by the Ipswich City Council (ICC) a conservative 50% blockage factor was adopted for the proposed culvert for the 100 year flood event. It was found that the provision of a new 'non-structural' flood relief point was not feasible because of the upgrade embankment road levels, so a 'structural' solution using oversized culverts was required. In order to assess the worse case impacts, the upgrade design for this culvert includes an extreme event assessment using the Probable Maximum Flood (PMF).

24. Culvert C-FS950 was deemed to be a Class B culvert, according to Queensland Drainage Manual (QUDM), because it is close to a park and residential areas. It is therefore provided with an inlet screen.

25. The adopted culvert solution was 5x 2100mm diameter reinforced concrete pipes (RCP).

26. Localised regrading (approximately 1m depth) was required to form the upgraded culvert inlet area. Refer Drawing No.D-1034 for details. The proposed works include

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scour protection at the upstream side of McAuliffe Street but not an upgrade of the McAuliffe Street roadway or culverts.

27. The relief channel suggested by the ICC was not physically possible given the constraints arising from the height of the road embankment and the surrounding surface levels. Accordingly, the project designers ran the drainage model again using more conservative assumptions which lead to the provision of two additional culverts and increasing the diameter of all the culverts.

28. This resulted in the provision of hydraulic capacity that exceeded the runoff from the local catchment area for the range of design flood events. In addition the culverts had conservative factors applied for blockage which is very conservative particularly given the nature of this catchment (being clear of aspects that might generate debris).

29. The relief channel would not have provided any additional flood mitigation given the nature (regional flood) of the January floods

Discussion

30. A new 5x2100 mm diameter RCP culvert arrangement was proposed at this location. The discharge from this arrangement will pass through the existing McAuliffe Street culvert and over the roadway which will remain unchanged, except for additional scour protection.

31. The afflux at the upstream end of the proposed culvert system (location C-FS950A) was checked and a water level increase of 96mm for the 20 year ARI and an increase of 127mm for the 100 year ARI event was predicted (based on a 50% blockage factor being applied). This was based on the conservative assumption that the inlet screen and culverts would both have 50% blockage. The predicted ultimate 100 year flood level is 10.749 m at the culvert inlet and provides over 1.45m freeboard to the ground level (lowest level) at the nearest housing area located at 12.20 m. The properties adjacent to the culvert and the QR culvert will not be affected by the 100 year ARI flood event. The land immediately upstream of the culvert between Monash Road and the Queensland Rail embankment is owned by DTMR.

32. The predicted flood level in the PMF event of 11.604 m represents an increase in water level of 473mm. At this level no flooding of the existing property structure floor levels are expected.

33. The depth / velocity (dv product) value for the McAuliffe Street overtopping flow was calculated for the 20 year and 100year ARI events. The width of the overtopping part of the road was taken as 32m. It was found that the estimated value for ultimate case of 0.12 m2/s for 20 year ARI is slightly higher than the existing value of 0.11 m2/s. The 100 year ARI depth by velocity product was estimated as 0.2m2/s. Both satisfy the QUDM allowable depth by velocity product of 0.4m2/s.

34. At this stage (100% final design) the hydraulic calculations for the culverts provides an acceptable design.

35. A safety analysis was performed in accordance with QUDM to determine the need for safety screens or fencing at the culvert inlet. An inlet screen has been incorporated into this design. Scour protection and pipe loading and bedding calculations have been included

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36. A copy of the Final Design Report -Transverse Drainage - Zone 2, Other Culverts - Report No. D2G-BASD-RERODR206-R-1000 dated 30 September 2010 is attached and marked **Attachment B.**

I make this statement of my own free will believing its contents to be true and correct.

Dated at [redacted] this 17 day of October 2011

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Derek Millar

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